

Government of Pakistan  
**National Vocational and Technical Training  
Commission**

**Prime Minister's Hunarmand Pakistan Program**

"Skills for All"



**Course Contents / Lesson Plan**  
**Course Title:** Big Data Analytics  
**Duration:** 3 Months

|                                       |   |
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| <b>Trainer Name</b>                   |   |
| <b>Course Title</b>                   | Big Data Analytics  |
| <b>Objective of Course</b>            |   |
| <b>Learning Outcome of the Course</b> | <p>Employable skills in Big Data Analytics and Microsoft Azure Data Engineering.</p> <p>This is a special course designed to address unemployment in the youth. The course aims to empower students with the right skillset that would help them get Big Data Analyst jobs in the industry. The course offers a broad, cross-disciplinary learning experience for students looking to pursue careers in relevant industry.</p> <p>In this course, students are introduced to key aspects of the design process, from research/strategy, creative brief development, and campaign development to teamwork and presentation and content creation so that they can enter the relevant market as strong candidates for beginner to intermediate level jobs.</p> <p>In short, the course under reference should be delivered by professional instructors in such a robust hands-on manner that the trainees are comfortably able to employ their skills for earning money (through wage/self-employment) at its conclusion.</p> <p>This course thus clearly goes beyond the domain of the traditional training practices in vogue and underscores an expectation that a market-centric approach will be adopted as the main driving force while delivering it. The instructors should therefore be experienced enough to be able to identify the training needs for the possible market roles available out there. Moreover, they should also know the strengths and weaknesses of each trainee to prepare them for such market roles during/after the training.</p> <p>Specially designed practical tasks to be performed by the trainees have been included in the Annexure-I to this document. The record of all tasks performed individually or in groups must be preserved by the management of the training Institute clearly labeling name, trade, session, etc. so that these are ready to be physically inspected/verified through monitoring visits from time to time. The weekly distribution of tasks has also been indicated in the weekly lesson plan given in this document.</p> <p>To materialize the main expectations, a special module on Job Search &amp; Entrepreneurial Skills has been included in the latter</p> |

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|  | <p>part of this course (5th &amp; 6th month) through which, the trainees will be made aware of the Job search techniques in the local as well as international job markets (Gulf countries). Awareness around the visa process and immigration laws of the most favored labor destination countries also form a part of this module. Moreover, the trainees would also be encouraged to venture into self-employment and exposed to the main requirements in this regard. It is also expected that a sense of civic duties/roles and responsibilities will also be inculcated in the trainees to make them responsible citizens of the country.</p> <p>A module on Work Place Ethics has also been included to highlight the importance of good and positive behavior in the workplace in the line with the best practices elsewhere in the world. An outline of such qualities has been given in the Appendix to this document. Its 3   Big Data Analytics importance should be conveyed in a format that is attractive and interesting for the trainees such as through PPT slides +short video documentaries. Needless to say that if the training provider puts his heart and soul into these otherwise non-technical components, the image of the Pakistani workforce would undergo a positive transformation in the local as well as international job markets.</p> <p>To maintain interest and motivation of the trainees throughout the course, modern techniques such as:</p> <ul style="list-style-type: none"> <li>• Motivational Lectures</li> <li>• Success Stories</li> <li>• Case Studies</li> </ul> <p>These techniques would be employed as an additional training tool wherever possible (these are explained in the subsequent section on Training Methodology).</p> <p>Moreover, you will learn not only all these skills but also learn to use Microsoft Azure API for Data Engineering.</p> |
| <b>Course Execution Plan</b>                           | <p>Total Duration of Course: 3 Months</p> <p>Class Hours: 4 Hours per day</p> <p>Theory: 20% Practical: 80%</p>   |
| <b>Companies Offering Jobs in the respective trade</b> | <p>Every company nowadays has huge amounts of Data, and they are in need of good analyst that can help them shape their business future.</p>  |

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| <b>Job Opportunities</b> | <ul style="list-style-type: none"><li>• Dat Engineer</li><li>• Data Analyst</li><li>• Junior Data Scientist</li><li>• Big Data Engineer</li></ul> |
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| <b>No of Students</b>                               | 25  |
| <b>Learning Place</b>                               | Classroom / Lab   |
| <b>Instructional Resources / Reference Material</b> | <p><b>Linux:</b></p> <ul style="list-style-type: none"> <li>• Learn Linux Shell Scripting – Fundamentals of Bash 4.4<br/>[Sebastiaan Tammer - Packt Publishing Ltd.]</li> <li>• Sams Teach Yourself Shell Programming in 24 Hours<br/>[Second Edition , Sams Publishing]</li> <li>• Applied Data Science – (Chapter 01)<br/>[Ian Langmore &amp; Daniel Krasner]</li> <li>• Linux Tutorial – Basic Command Line<br/><a href="https://www.youtube.com/watch?v=cBokz0LTizk">https://www.youtube.com/watch?v=cBokz0LTizk</a></li> </ul> <p><b>Python:</b></p> <ul style="list-style-type: none"> <li>• Learning Python – 2<sup>nd</sup> Edition (Ch:12: OOP in Python)<br/>[B. Nagesh Rao, CyberPlus Infotech Pvt. Ltd.]</li> <li>• Python for Everybody<br/>[Dr. Charles R. Severance]</li> <li>• Python: A Simple Tutorial<br/>[Matt Huenerfauth, University of Pennsylvania, USA]</li> <li>• Smarter Way to Learn Python<br/>[Mark Mayers]</li> <li>• A Python Book: Beginning Python, Advanced Python, and Python Exercises<br/>[Dave Kuhlman]</li> <li>• Mastering Object-Oriented Python<br/>[Second Edition, Steven F. Lott, Pack Publishing Ltd.]</li> <li>• Python Official Documentation<br/><a href="https://docs.python.org/3/">https://docs.python.org/3/</a></li> </ul> <p><b>Descriptive Statistics and Probability:</b></p> <ul style="list-style-type: none"> <li>• Probability for Machine Learning<br/>[Jason Brownlee]</li> <li>• Making Sense of Data: A Practical Guide to Exploratory Data Analysis and Data Mining (Ch: 02)<br/>[Second Edition, Glenn J. Myatt &amp; Wayne P. Johnson, WILEY]</li> <li>• Practical Statistics for Data Scientists<br/>[Second Edition, Peter Bruce, Andrew Bruce, and Peter Gedeck, O'REILLY]</li> </ul> |

## Exploratory Data Analysis:

- Numpy
  - Python for Data Analysis (Ch:04, Appendix A: Advanced Numpy) [Second Edition, Wes McKinney, O'REILLY]
  - Numpy Official Documentation <https://numpy.org/doc/1.24/>
- Pandas
  - Pandas 1.x Cookbook [Second Edition, Matt Harrison & Theodore Petrou, Pack Publishing Ltd.]
  - Python for Data Analysis (Ch:05, 07, 10, 12) [Second Edition, Wes McKinney, O'REILLY]
  - Hands-on Exploratory Data Analysis with Python (Ch: 04, 06) [Suresh Kumar Mukhiya & Usman Ahmed, Pack Publishing Ltd.]
  - Pandas Official Documentation <https://pandas.pydata.org/docs/>
- Matplotlib
  - Pandas 1.x Cookbook (Ch:13) [Second Edition, Matt Harrison & Theodore Petrou, Pack Publishing Ltd.]
  - Hands-on Exploratory Data Analysis with Python (Ch: 04, 06) [Suresh Kumar Mukhiya & Usman Ahmed, Pack Publishing Ltd.]
  - Matplotlib Official Documentation <https://matplotlib.org/stable/index.html>
- Seaborn
  - Pandas 1.x Cookbook (Ch:13) [Second Edition, Matt Harrison & Theodore Petrou, Pack Publishing Ltd.]
  - Python for Data Analysis (Ch:09) [Second Edition, Wes McKinney, O'REILLY]
  - Seaborn Official Documentation <https://seaborn.pydata.org/>

**Plotly:**

- Interactive Dashboards and Data Apps with Plotly and Dash  
[Elias Dabbas, *Packt Publishing Ltd*]

**Microsoft Azure Data Engineering:**

- Azure Data Engineer Associate Certification Guide  
[*Newton Alex, Packt Publishing Ltd.*]
- Microsoft Azure Data Fundamentals Training
- <https://learn.microsoft.com/en-us/certifications/exams/dp-900/>
- Microsoft Azure Data Engineer Associate Training
- <https://learn.microsoft.com/en-us/certifications/exams/dp-203/>
- Microsoft Learn for Educators Program  
<https://learn.microsoft.com/en-us/training/educator-center/programs/msle/>

**Software Download:**

- Anaconda  
<https://www.anaconda.com/>
- VSCode  
<https://code.visualstudio.com/>
- PyCharm (Community Edition)  
<https://www.jetbrains.com/pycharm/>

| Schedule d Week | Module Title        |                                    |           | Learning Units   | Remarks   |  |
|-----------------|---------------------|------------------------------------|-----------|--|---|--|
| Week 1          | Introduction        | Day 1                              | Hour# 1   | <ul style="list-style-type: none"> <li>• Introduction to AI</li> <li>• Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>   | <ul style="list-style-type: none"> <li>• Task 1</li> <li>• Task 2</li> <li>• Task 3-25</li> </ul> <p><u>Details may be seen at Annexure-I</u></p> |  |
|                 |                     |                                    | Hour# 2   | <ul style="list-style-type: none"> <li>• Course Introduction</li> <li>• Job market</li> <li>• Course Applications</li> <li>• Work ethics</li> <li>• Survey of career opportunities</li> <li>• Survey of industry requirements for each career path</li> <li>•</li> </ul> |   |  |
|                 |                     | Linux Shell Scripting Fundamentals | Day 2     | Hour# 3, 4   |   | <ul style="list-style-type: none"> <li>• Software Installation (Anaconda, VSCode, PyCharm, etc.)</li> </ul>  |
|                 |                     |                                    |           | Hour# 1  |   | <ul style="list-style-type: none"> <li>• Introduction to Debian</li> <li>• Basic Commands: pwd, cd, ls, cat, sudo, man, redirection, mkdir, rm, rmdir, cp, mv</li> </ul> |
|                 | Python Fundamentals | Day 3                              | Hour# 2   | <ul style="list-style-type: none"> <li>• file, reading, cat, more, less, head, alias,</li> </ul>   |   |  |
|                 |                     |                                    | Hour# 3   | <ul style="list-style-type: none"> <li>• shutdown, restart, touch, nano, bash, sh, chmod, ps, kill, dpkg</li> </ul>  |   |  |
|                 |                     |                                    | Hour# 4   | <ul style="list-style-type: none"> <li>• Package update and upgrade</li> <li>• Environment Variables</li> </ul>  |   |  |
|                 |                     |                                    | Hour# 1   | <ul style="list-style-type: none"> <li>• Values, expressions, and statements</li> <li>• Numbers, Booleans, Strings</li> <li>• Operators, variables and keywords</li> </ul>   |   |  |
|                 |                     |                                    | Hour# 2,3 | <ul style="list-style-type: none"> <li>• String operations</li> </ul>  |   |  |
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|               |                     |  | Hour #<br>4     | <ul style="list-style-type: none"> <li>• Input and Type casting</li> <li>• Comments</li> </ul>   |   |   |
|               |                     | Day 4                                      | Hour #<br>1 & 2 | Data Structures <ul style="list-style-type: none"> <li>• Lists</li> <li>• Tuples</li> </ul>  |   |   |
|               |                     |  | Hour #<br>3 & 4 | <ul style="list-style-type: none"> <li>• Dictionaries</li> <li>• Sets</li> </ul>   |   |   |
|               |                     | Day 5                                      | Hour #<br>1 & 2 | Conditional Execution <ul style="list-style-type: none"> <li>• If, elif, and else statements</li> <li>• Break, continue, and pass statements</li> <li>• Nested conditionals</li> <li>• Conditional (Ternary) Expression</li> </ul> |   |   |
|               |                     |  | Hour #<br>3 & 4 | <ul style="list-style-type: none"> <li>• While, for loops and use of enumerate</li> <li>• Nested loops</li> <li>• List comprehension</li> <li>• Iterators and Iterables</li> <li>•</li> </ul>                                      |   |   |
| <b>Week 2</b> | Python Fundamentals | Day 1                                      | Hour#<br>1      | <ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>   | <ul style="list-style-type: none"> <li>• Task 26-27</li> <li>• Task 49-51</li> </ul>  |   |
|               |                     |  | Hour#<br>2, 3   | <ul style="list-style-type: none"> <li>• Functions</li> <li>• Functions and variable scope</li> <li>• Lambda expression</li> <li>• Map and Filter</li> <li>• Inner/Nested functions</li> </ul>                                     |   |   |
|               |                     |  | Hour #<br>4     | <ul style="list-style-type: none"> <li>• File Handling</li> <li>• Exception Handling</li> </ul>  |   |   |
|               |                     | Implementation of OOP Principals in Python | Day 2           | Hour#<br>1   | <ul style="list-style-type: none"> <li>• Classes and Objects</li> <li>• Instance Variables and Methods</li> <li>• Class Variables and Functions</li> <li>• Constructors and Destructors</li> </ul>        | <i><u>Details may be seen at Annexure-I</u></i> |
|               |                     |  |                 | Hour#<br>2,3   | <ul style="list-style-type: none"> <li>• Inheritance</li> <li>• Multilevel Inheritance</li> <li>• Hierarchical Inheritance</li> <li>• Multiple Inheritance, Method Resolution Order</li> </ul>            |   |
|               |                     |  |                 | Hour#<br>4   | <ul style="list-style-type: none"> <li>• Access Specifiers: Private, Public, Protected</li> <li>• Name Mangling</li> <li>• Inner/Nested Class</li> <li>• Association, Aggregation, Composition</li> </ul> |   |
|               |                     | Day 3                                      | Hour#<br>1      | <ul style="list-style-type: none"> <li>• Polymorphism and Operator Overloading</li> </ul>  |   |   |

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|               |  |              | Hour#<br>2  | <ul style="list-style-type: none"> <li>• Magic Functions/Dunder Functions</li> </ul>   |  |
|               |  |              | Hour#<br>3  | <ul style="list-style-type: none"> <li>• Dynamic Polymorphism (subclass as base class)</li> </ul>  |  |
|               |  |              | Hour#<br>4  | <ul style="list-style-type: none"> <li>• Abstract Method and Class, Empty Class, Data Class</li> <li>• Keyword Arguments</li> </ul>  |  |
|               | Descriptive Statistics and Probability Overview                | Day 4        | Hour#<br>1, 2   | <ul style="list-style-type: none"> <li>• Data and its types (structured, Unstructured)</li> <li>• Quantitative data, Numerical, Continuous, and Discrete variables</li> <li>• Qualitative data, Categorical, Nominal, Ordinal, and Binary variables</li> </ul> |  |
|               |  |              | Hour#<br>3-4  | Measures of Central Tendency <ul style="list-style-type: none"> <li>• Mean, Mode, Median</li> </ul>  |  |
|               |  | Day 5        | Hour#<br>1,2  | Measures of Dispersion <ul style="list-style-type: none"> <li>• Variance, Standard deviation</li> <li>• Co-efficient of variation, skewness and kurtosis</li> </ul>  |  |
|               |  |              | Hour#<br>3, 4   | Measures of Position <ul style="list-style-type: none"> <li>• Z-Score, Percentile, Quartile</li> </ul>   |  |
| <b>Week 3</b> | Descriptive Statistics and Probability Overview                | Day 1        | Hour#<br>1  | <ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>   | <ul style="list-style-type: none"> <li>• Task 28-48</li> </ul> |
|               |  |              | Hour#<br>2  | <ul style="list-style-type: none"> <li>• Correlation Coefficient</li> </ul>  |  |
|               |  |              | Hour#<br>3  | <ul style="list-style-type: none"> <li>• Univariate, bivariate and multivariate plots</li> </ul>   |  |
|               |  |              | Hour#<br>4  | Probability  |  |
|               | Day 2  | Hour#<br>1   | Joint, Marginal and Conditional probability   | <i>Details may be seen at Annexure-I</i>   |  |
|               |  | Hour#<br>2   | <ul style="list-style-type: none"> <li>• Probability Distributions</li> <li>•</li> </ul>  |  |  |
|               |  | Hour#<br>3-4 | <ul style="list-style-type: none"> <li>• Discrete and Continuous probability distributions</li> <li>• Bayesian Probability</li> </ul> |  |  |
|               | Python Support Libraries for Exploratory Data Analysis - NUMPY | Day 3        | Hour#<br>1  | <ul style="list-style-type: none"> <li>• Introduction to Numpy</li> </ul>  |  |
|               |  |              | Hour#<br>2,3,4  | <ul style="list-style-type: none"> <li>• Creating Numpy Arrays (from Python list, from built-in methods, from random)</li> <li>• Array Attributes and Methods (reshape, max, min, argmax, argmin, shape, dtype, size,</li> </ul>                               |  |

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|               |            |   |   | <ul style="list-style-type: none"> <li>ndim)</li> <li>Operations on Arrays (copying, append and Insert, Sorting, Removing/Deleting, Combining/Concatenating, Splitting)</li> </ul>  |  |  |  |  |
|               | - Pandas   | Day 4   | Hour # 1-2  | <ul style="list-style-type: none"> <li>Data Loading &amp; Saving</li> <li>NumPy Indexing and Selection (Indexing a 2D array, Logical Selection)</li> <li>Broadcasting</li> </ul>  |  |  |  |  |
| Hour # 3-4    |            |   | <ul style="list-style-type: none"> <li>Type Casting</li> <li>Arithmetic Operations (Add, Subtract, Multiply, Divide, Exponentiation)</li> <li>Universal Array Functions (sqrt, exp, max, sin, etc)</li> </ul>   |   |  |  |  |  |
| Day 5         |            | Hour# 1   | <ul style="list-style-type: none"> <li>Introduction to Pandas</li> </ul>  |   |  |  |  |  |
|               |            | Hour# 2   | <ul style="list-style-type: none"> <li>Series and DataFrame and Data Input</li> <li>Selection and Indexing (rows, columns, conditional selection, selection of subset of rows and columns, index setting, etc)</li> </ul>                                     |   |  |  |  |  |
|               |            | Hour# 3   | <ul style="list-style-type: none"> <li>Operations on DataFrames (head, unique, value counts, applying custom functions, getting column and index names, sorting and ordering, null value check, value replacement, dropping rows and columns, etc)</li> </ul> |   |  |  |  |  |
|               |            | Hour# 4   | <ul style="list-style-type: none"> <li>Missing data &amp; its handling</li> </ul>   |   |  |  |  |  |
| <b>Week 4</b> |            | Python Support Libraries for Exploratory Data Analysis<br>- Pandas<br>- Seaborn | Day 1   | Hour# 1   | <ul style="list-style-type: none"> <li>Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>   | <ul style="list-style-type: none"> <li>Task 28-48</li> <li>51</li> </ul> |  |  |
|               |            |   |   | Hour# 2   | <ul style="list-style-type: none"> <li>Merging, Joining, and Concatenation (inner, outer, right and left joins)</li> </ul> |  |  |  |
|               | Hour # 3-4 |   |   | <ul style="list-style-type: none"> <li>GroupBy</li> <li>Discretization and Binning</li> <li>Operations on DataFrames</li> <li>Data output/saving</li> <li>Pandas for Plotting (area, bar, density, hist, line, scatter, barh, box, hexbin, kde, and pie plots)</li> </ul> |  |  |  |  |
|               | Day 2      |   | Hour# 1   | <ul style="list-style-type: none"> <li>Introduction to Seaborn</li> </ul>   | <i>Details may be seen at Annexure-I</i>   |  |  |  |
|               |            |   | Hour# 2   | Distribution Plots <ul style="list-style-type: none"> <li>distplot</li> <li>jointplot (pairplot, rugplot, kdeplot)</li> </ul>   |  |  |  |  |
|               |            |   | Hour# 3   | Categorical Data Plots <ul style="list-style-type: none"> <li>factorplot, boxplot, violinplot, stripplot, swarmplot, barplot, countplot</li> </ul>  |  |  |  |  |
|               |            |   | Hour# 4   | Matrix Plots <ul style="list-style-type: none"> <li>Heatmap</li> </ul>  |  |  |  |  |
|               | Day 3      |   | Hour# 1,2,3,  | <ul style="list-style-type: none"> <li>Introduction to Databases</li> <li>File-based vs DB-based systems</li> </ul>   |  |  |  |  |
|               |            |   | SQL   |   |  |  |  |  |

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|  |  | 4                   | <ul style="list-style-type: none"> <li>• Features of DBMS (query language, report generator, access</li> <li>• security, backup &amp; recovery)</li> <li>• Field, Record, Attribute, Row, and Table/Relation</li> <li>• Properties of a Table/Relation</li> <li>• Views</li> <li>• Keys</li> <li>• Primary Key</li> <li>• Secondary Key</li> <li>• Candidate Key</li> <li>• Composite Key</li> <li>• Sort/Control Key</li> <li>• Foreign Key</li> <li>• Data Modeling</li> <li>• Cardinality</li> <li>• Modality</li> <li>• Entity Relationship Diagram (ER-Diagram)</li> </ul> |
|  |  | Hour#<br>2,3,4      | <ul style="list-style-type: none"> <li>• SQL Introduction</li> <li>• DDL - Data Definition Language</li> <li>• DQL - Data Query Language</li> <li>• DML - Data Manipulation Language</li> <li>• DCL - Data Control Language</li> <li>• TCL - Transaction Control Language</li> </ul> <p>SQL Commands</p> <ul style="list-style-type: none"> <li>• Create</li> <li>• Alter</li> <li>• Drop</li> <li>• Insert</li> <li>• Update</li> <li>• Delete</li> <li>• Truncate</li> <li>• Comment</li> <li>• Rename</li> </ul>   |
|  |  | Day 4 Hour<br># 1,2 | <ul style="list-style-type: none"> <li>• Select</li> <li>• Where</li> <li>• Like</li> <li>• Order By</li> <li>• Group By</li> <li>• Having</li> </ul>   |
|  |  | Hour<br># 3,4       | <ul style="list-style-type: none"> <li>• Distinct keyword</li> <li>• And, OR operator</li> <li>• Division operator</li> </ul>   |
|  |  | Day 5 Hour<br># 1-2 | <ul style="list-style-type: none"> <li>• Commit</li> <li>• Rollback</li> </ul>  |
|  |  | Hour<br># 3-4       | <ul style="list-style-type: none"> <li>• Join (Inner, Outer, Left, Right)</li> <li>• String operations and wild cards</li> </ul>  |

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| <b>Week 5</b>                        | Data Visualization –<br>Dashboard<br>- Plotly        | Day 1 | Hour#<br>1       | <ul style="list-style-type: none"> <li>Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>                | <ul style="list-style-type: none"> <li>Task 52</li> </ul><br><i>Details may be seen at Annexure-I</i> |
|                                      |  |       | Hour#<br>2,3,4   | <ul style="list-style-type: none"> <li>Overview of the Dash Ecosystem</li> <li>Exploring the structure of a Dash application</li> </ul> |   |
|                                      |  | Day 2 | Hour#<br>1,2,3,4 | <ul style="list-style-type: none"> <li>Working with Plotly's figure Object</li> <li>Data manipulation and preparation</li> </ul>        |   |
|                                      |  | Day 3 | Hour#<br>1,2,3,4 | <ul style="list-style-type: none"> <li>Interactively comparing values with Bar charts and Dropown menus</li> </ul>                      |   |
|                                      |  | Day 4 | Hour#<br>1,2,3,4 | <ul style="list-style-type: none"> <li>Exploring Variables with Scatter Plots and Filtering Subsets with Sliders</li> </ul>             |   |
|                                      |  | Day 5 | Hour#<br>1,2,3,4 | <ul style="list-style-type: none"> <li>Exploring Map Plots and Enriching Your Dashboards with Markdown</li> </ul>                       |   |
| <b>Week 6</b>                        | Data Visualization –<br>Dashboard Making<br>- Plotly | Day 1 | Hour#<br>1       | <ul style="list-style-type: none"> <li>Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>                | <ul style="list-style-type: none"> <li>Task 52</li> </ul><br><i>Details may be seen at Annexure-I</i> |
|                                      |  |       | Hour#<br>2,3,4   | <ul style="list-style-type: none"> <li>Calculating Data Frequency and Building Interactive Tables</li> </ul>                            |   |
|                                      |  | Day 2 | Hour#<br>1,2,3,4 | <ul style="list-style-type: none"> <li>Callbacks in apps</li> </ul>   |   |
|                                      |  | Day 3 | Hour#<br>1,2,3,4 | <ul style="list-style-type: none"> <li>URLs and Multi-Page Apps</li> </ul>  |   |
|                                      |  | Day 4 | Hour#<br>1,2,3,4 | <ul style="list-style-type: none"> <li>Deployment of app</li> </ul>   |   |
|                                      |  | Day 5 | Hour#<br>1,2     | <ul style="list-style-type: none"> <li>Code Practice</li> </ul>   |   |
| <b>Build Your CV – Mid-term Exam</b> |  |       |                  |   |   |
| <b>Week 7</b>                        | Azure Data Engineering                               | Day 1 | Hour#<br>1       | <ul style="list-style-type: none"> <li>Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>                | <ul style="list-style-type: none"> <li>Task 53</li> </ul><br><i>Details may be seen at Annexure-I</i> |
|                                      |  |       | Hour#<br>2,3,4   | <ul style="list-style-type: none"> <li>Design and implement data storage</li> <li>Implement a partition strategy for files</li> </ul>   |   |
|                                      |  | Day 2 | Hour#<br>1,2,3,4 | <ul style="list-style-type: none"> <li>Implement a partition strategy for analytical workloads</li> </ul>                               |   |
|                                      |  | Day 3 | Hour#<br>1,2,3,4 | <ul style="list-style-type: none"> <li>Implement a partition strategy for streaming workloads</li> </ul>                                |   |
|                                      |  | Day 4 | Hour#<br>1,2,3,  | <ul style="list-style-type: none"> <li>Implement a partition strategy for Azure Synapse Analytics</li> </ul>                            |   |

|               |                        |       |               |   |  |
|---------------|------------------------|-------|---------------|---|--|
|               |                        |       | 4             |   |  |
|               |                        | Day 5 | Hour # 1-2    | <ul style="list-style-type: none"> <li>Identify when partitioning is needed in Azure Data Lake Storage Gen2</li> </ul>  |  |
|               |                        |       | Hour # 3-4    | Design and implement the data exploration layer <ul style="list-style-type: none"> <li>Create and execute queries by using a compute solution that leverages SQL serverless and Spark cluster – I</li> </ul>  |  |
| <b>Week 8</b> | Azure Data Engineering | Day 1 | Hour# 1       | <ul style="list-style-type: none"> <li>Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>  | <ul style="list-style-type: none"> <li>Task 53</li> </ul> <p><i><u>Details may be seen at Annexure-I</u></i></p> |
|               |                        |       | Hour# 2,3,4   | <ul style="list-style-type: none"> <li>Create and execute queries by using a compute solution that leverages SQL serverless and Spark cluster – II</li> </ul>   |  |
|               |                        | Day 2 | Hour# 1,2,3,4 | <ul style="list-style-type: none"> <li>Implement Azure Synapse Analytics database templates</li> <li>Recommend Azure Synapse Analytics database templates</li> <li>Push new or updated data lineage to Microsoft Purview</li> <li>Browse and search metadata in Microsoft Purview Data Catalog</li> </ul>   |  |
|               |                        | Day 3 | Hour# 1,2,3,4 | Ingest and transform data <ul style="list-style-type: none"> <li>Design and implement incremental loads</li> <li>Transform data by using Apache Spark</li> <li>Transform data by using Transact-SQL (T-SQL)</li> <li>Ingest and transform data by using Azure Synapse Pipelines or Azure Data Factory</li> <li>Transform data by using Azure Stream Analytics</li> <li>Cleanse data</li> <li>Handle duplicate data</li> <li>Handle missing data</li> <li>Handle late-arriving data</li> <li>Split data</li> </ul> |  |
|               |                        | Day 4 | Hour# 1,2,3,4 | <ul style="list-style-type: none"> <li>Shred JSON</li> <li>Encode and decode data</li> <li>Configure error handling for a transformation</li> <li>Normalize and denormalize values</li> <li>Perform data exploratory analysis</li> </ul>  |  |
|               |                        | Day 5 | Hour #1,2,3,4 | Develop a batch processing solution <ul style="list-style-type: none"> <li>Develop batch processing solutions by using Azure Data Lake Storage, Azure Databricks, Azure Synapse Analytics, and Azure Data Factory</li> <li>Use PolyBase to load data to a SQL pool</li> <li>Implement Azure Synapse Link and query the replicated data</li> <li>Create data pipelines</li> <li>Scale resources</li> </ul>   |  |

|                |                        |   |               |   |   |  |
|----------------|------------------------|---|---------------|---|---|--|
|                |                        |   |               | <ul style="list-style-type: none"> <li>• Configure the batch size</li> <li>• Create tests for data pipelines</li> </ul>   |   |  |
| <b>Week 9</b>  | Azure Data Engineering | Day 1   | Hour# 1       | <ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>  | <ul style="list-style-type: none"> <li>• Task 53</li> </ul> |  |
|                |                        |   | Hour# 2,3,4   | Integrate Jupyter or Python notebooks into a data pipeline <ul style="list-style-type: none"> <li>• Upsert data</li> <li>• Revert data to a previous state</li> <li>• Configure exception handling</li> <li>• Configure batch retention</li> <li>• Read from and write to a delta lake</li> </ul>   |   |  |
|                |                        | Day 2   | Hour# 1,2,3,4 | Develop a stream processing solution <ul style="list-style-type: none"> <li>• Create a stream processing solution by using Stream Analytics and Azure Event Hubs</li> <li>• Process data by using Spark structured streaming</li> <li>• Create windowed aggregates</li> <li>• Handle schema drift</li> <li>• Process time series data</li> <li>• Process data across partitions</li> </ul>  |   | <i>Details may be seen at Annexure-I</i> |
|                |                        | Day 3   | Hour# 1,2,3,4 | <ul style="list-style-type: none"> <li>• Process within one partition</li> <li>• Configure checkpoints and watermarking during processing</li> <li>• Scale resources</li> <li>• Create tests for data pipelines</li> <li>• Optimize pipelines for analytical or transactional purposes</li> <li>• Handle interruptions</li> <li>• Configure exception handling</li> <li>• Upsert data</li> <li>• Replay archived stream data</li> </ul> |   |  |
|                |                        | Day 4   | Hour# 1,2,3,4 | Manage batches and pipelines <ul style="list-style-type: none"> <li>• Trigger batches</li> <li>• Handle failed batch loads</li> <li>• Validate batch loads</li> </ul>   |   |  |
| Day 5          | Hour# 1,2,3,4          | <ul style="list-style-type: none"> <li>• Manage data pipelines in Azure Data Factory or Azure Synapse Pipelines</li> <li>• Schedule data pipelines in Data Factory or Azure Synapse Pipelines</li> <li>• Implement version control for pipeline artifacts</li> <li>• Manage Spark jobs in a pipeline</li> </ul> |               |   |   |  |
| <b>Week 10</b> | Azure Data Engineering | Day 1,2   | Hour# 1       | <ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>  |   |  |
|                |                        |   | Hour# 2,3,4   | Implement data security <ul style="list-style-type: none"> <li>• Implement data masking</li> <li>• Encrypt data at rest and in motion</li> <li>• Implement row-level and column-level security</li> </ul>   |   |  |

|  |   |         |               |   |   |
|--|---|---------|---------------|---|---|
|  | Employable Project / Assignment (2 weeks, 11-12) in addition of regular classes.<br>OR<br>On job training (2 weeks) |         |               | <ul style="list-style-type: none"> <li>Implement Azure role-based access control (RBAC)</li> <li>Implement POSIX-like access control lists (ACLs) for Data Lake Storage Gen2</li> <li>Implement a data retention policy</li> <li>Implement secure endpoints (private and public)</li> </ul>   | <ul style="list-style-type: none"> <li>Task 53</li> </ul> |
|  |   | Day 3,4 | Hour# 1,2,3,4 | <ul style="list-style-type: none"> <li>Implement resource tokens in Azure Databricks</li> <li>Load a DataFrame with sensitive information</li> <li>Write encrypted data to tables or Parquet files</li> <li>Manage sensitive information</li> </ul>   | <u>Details may be seen at Annexure-I</u>                  |
|  |   | Day 5   | Hour# 1,2,3,4 | <p>Selection of Project, architecture discussion, preparation.</p> <ul style="list-style-type: none"> <li>Guidelines to the Trainees for selection of employable project like final year project (FYP).</li> <li>Assignment of Independent project to each Trainee.</li> <li>A project based on trainee's aptitude and acquired skills.</li> <li>Designed by keeping in view the emerging trends in the local market as well as across the globe.</li> <li>The project idea may be based on entrepreneurship.</li> <li>Leading to the successful employment.</li> <li>The duration of the project will be 2 weeks</li> <li>Ideas may be generated via different sites such as:<br/> <a href="https://1000projects.org/">https://1000projects.org/</a><br/> <a href="https://nevonprojects.com/">https://nevonprojects.com/</a><br/> <a href="https://www.freestudentprojects.com/">https://www.freestudentprojects.com/</a><br/> <a href="https://technofizi.net/best-computer-science-and-engineering-cse-project-topics-ideas-for-students/">https://technofizi.net/best-computer-science-and-engineering-cse-project-topics-ideas-for-students/</a> </li> <li>Final viva/assessment will be conducted on project assignments.</li> <li>At the end of session, the project will be presented in skills competition.</li> <li>The skill competition will be conducted on zonal, regional and National level.</li> <li>The project will be presented in front of Industrialists for commercialization</li> <li>The best business idea will be placed in NAVTTC business incubation center for commercialization.</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>On job training for 2 weeks:</li> <li>Aims to provide 2 weeks industrial training to</li> </ul> |   |



|                |   |             |               |   |   |
|----------------|---|-------------|---------------|---|---|
|                |   |             |               | <p>the Trainees as part of overall training program</p> <ul style="list-style-type: none"> <li>• Ideal for the manufacturing trades</li> <li>• As an alternate to the projects that involve expensive equipment</li> <li>• Focuses on increasing Trainee's motivation, productivity, efficiency and quick learning approach.</li> </ul>           |   |
| <b>Week 11</b> | Azure Data Engineering                    | Day 1       | Hour# 1       | <ul style="list-style-type: none"> <li>• Motivational Lecture (For further detail please see Page No: 3&amp; 4)</li> </ul>  | <ul style="list-style-type: none"> <li>• Task 53</li> </ul> <p><i>Details may be seen at Annexure-I</i></p> |
|                |   |             | Hour# 2,3,4   | <ul style="list-style-type: none"> <li>• Monitor data storage and data processing</li> <li>• Implement logging used by Azure Monitor</li> <li>• Configure monitoring services</li> <li>• Monitor stream processing</li> <li>• Measure performance of data movement</li> <li>• Monitor and update statistics about data across a system</li> </ul> |   |
|                |   | Day 2       | Hour# 1,2,3,4 | <ul style="list-style-type: none"> <li>• Monitor data pipeline performance</li> <li>• Measure query performance</li> <li>• Schedule and monitor pipeline tests</li> <li>• Interpret Azure Monitor metrics and logs</li> <li>• Implement a pipeline alert strategy</li> </ul>  |   |
|                |   | Day 3       | Hour# 1-2     | <ul style="list-style-type: none"> <li>• Optimize and troubleshoot data storage and data processing</li> <li>• Compact small files</li> <li>• Handle skew in data</li> <li>• Handle data spill</li> <li>• Optimize resource management</li> </ul>   |   |
|                |   | Day 4       | Hour# 1,2,3,4 | <ul style="list-style-type: none"> <li>• Tune queries by using indexers</li> <li>• Tune queries by using cache</li> </ul>   |   |
|                |   | Day 5       | Hour# 1,2,3,4 | <ul style="list-style-type: none"> <li>• Troubleshoot a failed Spark job</li> <li>• Troubleshoot a failed pipeline run, including activities executed in external services</li> </ul>   |   |
| <b>Week 12</b> | Final Project Submission and Presentation | Day 1,2,3,4 | Hour# 1       | Exam Preparation<br>Project Presentation and Submission   |   |
|                |   | Day 5       | Hour# 1-4     | Final Exam  |   |



## Annexure-I

### List of Tasks

| Task No. | Task Title     | Description  | Week |
|----------|----------------|--|------|
| 1.       | Installation   | Download and install Anaconda3<br>Install PyTorch<br>Install TensorFlow 2.0<br>Install VSCode<br>Install PyCharm   | 1    |
| 2.       | Linux Commands | Practice these commands:<br>pwd, cd, ls, cat, sudo, man, redirection, mkdir, rm, rmdir, cp, mv, file, reading, cat, more, less, head, alias, shutdown, restart, touch, nano, bash, sh, chmod, ps, kill, dpkg | 1    |
| 3.       | Python         | <pre># This program adds two numbers  num1 = 1.5 num2 = 6.3  # Add two numbers sum = num1 + num2  # Display the sum print('The sum of {0} and {1} is {2}'.format(num1, num2, sum))</pre>                     | 1    |

|    |        |   |   |
|----|--------|---|---|
| 4. | Python | <pre># Store input numbers num1 = input('Enter first number: ') num2 = input('Enter second number: ')  # Add two numbers sum = float(num1) + float(num2)  # Display the sum print('The sum of {0} and {1} is {2}'.format(num1, num2, sum))</pre>                                | 1 |
| 5. | Python | <pre># Python Program to calculate the square root  # Note: change this value for a different result num = 8  # To take the input from the user #num = float(input('Enter a number: '))  num_sqrt = num ** 0.5 print('The square root of %0.3f is %0.3f'%(num ,num_sqrt))</pre> | 1 |

|    |        |  |   |
|----|--------|--|---|
| 6. | Python | <pre># Find square root of real or complex numbers # Importing the complex math module import cmath  num = 1+2j  # To take input from the user #num = eval(input('Enter a number: '))  num_sqrt = cmath.sqrt(num) print('The square root of {0} is {1:0.3f}+{2:0.3f}j'.format(num ,num_sqrt.real,num_sqrt.imag))</pre> | 1 |
| 7. | Python | <pre># Python Program to convert temperature in celsius to fahrenheit  # change this value for a different result celsius = 37.5  # calculate fahrenheit fahrenheit = (celsius * 1.8) + 32 print('%0.1f degree Celsius is equal to %0.1f degree Fahrenheit' %(celsius,fahrenheit))</pre>                               | 1 |

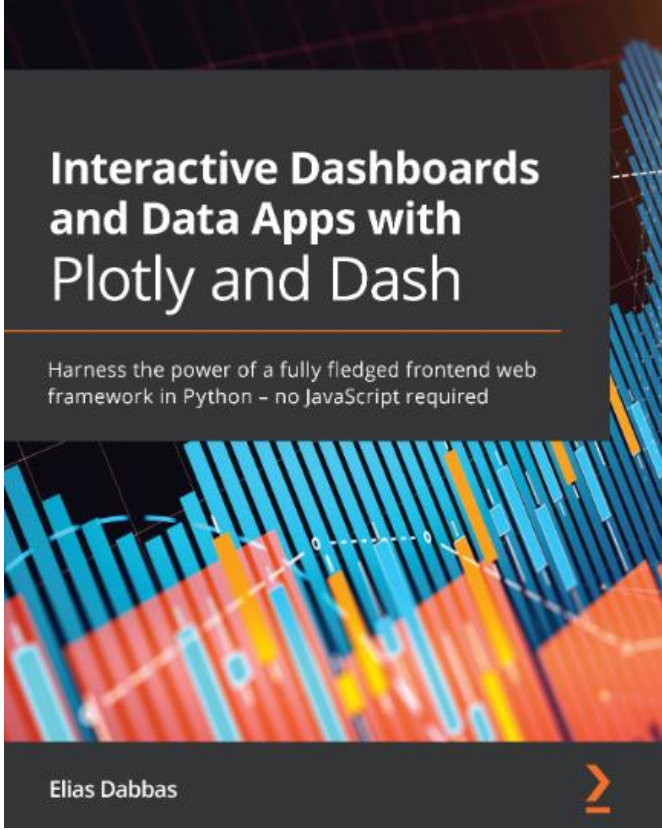
|    |        |  |   |
|----|--------|--|---|
| 8. | Python | <pre># Python Program to find the area of triangle  a = 5 b = 6 c = 7  # Uncomment below to take inputs from the user # a = float(input('Enter first side: ')) # b = float(input('Enter second side: ')) # c = float(input('Enter third side: '))  # calculate the semi-perimeter s = (a + b + c) / 2  # calculate the area area = (s*(s-a)*(s-b)*(s-c)) ** 0.5 print('The area of the triangle is %0.2f' %area)</pre> | 1 |
|----|--------|--|---|

|     |        |  |   |
|-----|--------|--|---|
| 9.  | Python | <pre> # Solve the quadratic equation ax**2 + bx + c = 0  # import complex math module import cmath  a = 1 b = 5 c = 6  # calculate the discriminant d = (b**2) - (4*a*c)  # find two solutions sol1 = (-b-cmath.sqrt(d))/(2*a) sol2 = (-b+cmath.sqrt(d))/(2*a)  print('The solution are {0} and {1}'.format(sol1,sol2)) </pre> | 1 |
| 10. | Python | <pre> # Taking kilometers input from the user kilometers = float(input("Enter value in kilometers: "))  # conversion factor conv_fac = 0.621371  # calculate miles miles = kilometers * conv_fac </pre>  | 1 |
| 11. | Python | <pre> i = 10 if (i &gt; 15):     print ("10 is less than 15") print ("I am Not in if") </pre>  | 1 |

|     |        |   |   |
|-----|--------|---|---|
| 12. | Python | <pre> i = 20; if (i &lt; 15):     print ("i is smaller than 15")     print ("i'm in if Block") else:     print ("i is greater than 15")     print ("i'm in else Block") print ("i'm not in if and not in else Block") </pre>  | 1 |
| 13. | Python | <pre> i = 10 if (i == 10):     # First if statement     if (i &lt; 15):         print ("i is smaller than 15")     # Nested - if statement     # Will only be executed if statement above     # it is true     if (i &lt; 12):         print ("i is smaller than 12 too")     else:         print ("i is greater than 15") </pre> | 1 |
| 14. | Python | <pre> i = 20 if (i == 10):     print ("i is 10") elif (i == 15):     print ("i is 15") elif (i == 20):     print ("i is 20") else:     print ("i is not present") </pre>  | 1 |
| 15. | Python | <p>Exercise on for loops in Python:<br/> <a href="https://www.geeksforgeeks.org/python-for-loops/">https://www.geeksforgeeks.org/python-for-loops/</a></p>  | 1 |
| 16. | Python | <p>Exercise on While loops in Python:<br/> <a href="https://www.geeksforgeeks.org/python-while-loops/">https://www.geeksforgeeks.org/python-while-loops/</a></p>  | 1 |
| 17. | Python | <p>Exercise on Break statement in Python:<br/> <a href="https://www.geeksforgeeks.org/python-break-statement/">https://www.geeksforgeeks.org/python-break-statement/</a></p>  | 1 |
| 18. | Python | <p>Exercise on Continue statement in Python:<br/> <a href="https://www.geeksforgeeks.org/python-continue-statement/">https://www.geeksforgeeks.org/python-continue-statement/</a></p>   | 1 |
| 19. | Python | <p>Exercise on various looping techniques in Python:<br/> <a href="https://www.geeksforgeeks.org/looping-techniques-python/">https://www.geeksforgeeks.org/looping-techniques-python/</a></p>   | 1 |
| 20. | Python | <p>Exercise on User defined functions in Python:<br/> <a href="https://www.geeksforgeeks.org/functions-in-python/">https://www.geeksforgeeks.org/functions-in-python/</a></p>   | 2 |



|     |        |   |     |
|-----|--------|---|-----|
| 21. | Python | Exercise on List data type in Python:<br><a href="https://www.programiz.com/python-programming/list">https://www.programiz.com/python-programming/list</a>  | 1   |
| 22. | Python | Exercise on Tuple data type in Python:<br><a href="https://www.programiz.com/python-programming/tuple">https://www.programiz.com/python-programming/tuple</a>   | 1   |
| 23. | Python | Exercise on String data type in Python:<br><a href="https://www.programiz.com/python-programming/string">https://www.programiz.com/python-programming/string</a>  | 1   |
| 24. | Python | Exercise on Set data type in Python:<br><a href="https://www.programiz.com/python-programming/set">https://www.programiz.com/python-programming/set</a>   | 1   |
| 25. | Python | Exercise on Dictionary data type in Python:<br><a href="https://www.programiz.com/python-programming/dictionary">https://www.programiz.com/python-programming/dictionary</a>                                    | 1   |
| 26. | Python | Exercise on Exception Handling in Python:<br><a href="https://www.programiz.com/python-programming/exception-handling">https://www.programiz.com/python-programming/exception-handling</a>                      | 2   |
| 27. | Python | Exercise on User defined Exception Handling in Python:<br><a href="https://www.programiz.com/python-programming/user-defined-exception">https://www.programiz.com/python-programming/user-defined-exception</a> | 2   |
| 28. | Numpy  | Exercise on Numpy create Array Using Python:<br><a href="https://www.w3schools.com/python/numpy_creating_arrays.asp">https://www.w3schools.com/python/numpy_creating_arrays.asp</a>                             | 3,4 |
| 29. | Numpy  | Exercise on Numpy Indexing in Array Using Python:<br><a href="https://www.w3schools.com/python/numpy_array_indexing.asp">https://www.w3schools.com/python/numpy_array_indexing.asp</a>                          | 3,4 |
| 30. | Numpy  | Exercise on Numpy Slicing in Array Using Python:<br><a href="https://www.w3schools.com/python/numpy_array_slicing.asp">https://www.w3schools.com/python/numpy_array_slicing.asp</a>                             | 3,4 |
| 31. | Numpy  | Exercise on Numpy Slicing in Array Using Python:<br><a href="https://www.w3schools.com/python/numpy_data_types.asp">https://www.w3schools.com/python/numpy_data_types.asp</a>                                   | 3,4 |
| 32. | Numpy  | Exercise on Numpy Array coping and viewing :<br><a href="https://www.w3schools.com/python/numpy_copy_vs_view.asp">https://www.w3schools.com/python/numpy_copy_vs_view.asp</a>                                   | 3,4 |
| 33. | Numpy  | Exercise on Numpy Array Shaping :<br><a href="https://www.w3schools.com/python/numpy_array_shape.asp">https://www.w3schools.com/python/numpy_array_shape.asp</a>  | 3,4 |
| 34. | Numpy  | Exercise on Numpy Array reshaping :<br><a href="https://www.w3schools.com/python/numpy_array_reshape.asp">https://www.w3schools.com/python/numpy_array_reshape.asp</a>  | 3,4 |
| 35. | Numpy  | Exercise on Numpy Array iteration:<br><a href="https://www.w3schools.com/python/numpy_array_iterating.asp">https://www.w3schools.com/python/numpy_array_iterating.asp</a>                                       | 3,4 |
| 36. | Numpy  | Exercise on Numpy Matrix joining<br><a href="https://www.w3schools.com/python/numpy_array_join_Week_4.asp">https://www.w3schools.com/python/numpy_array_join_Week_4.asp</a>                                     | 3,4 |
| 37. | Numpy  | Exercise on Numpy Array splitting<br><a href="https://www.w3schools.com/python/numpy_array_split.asp">https://www.w3schools.com/python/numpy_array_split.asp</a>  | 3,4 |
| 38. | Numpy  | Exercise on Numpy Array searching<br><a href="https://www.w3schools.com/python/numpy_array_search.asp">https://www.w3schools.com/python/numpy_array_search.asp</a>  | 3,4 |
| 39. | Numpy  | Exercise on Numpy Array sorting<br><a href="https://www.w3schools.com/python/numpy_array_sort.asp">https://www.w3schools.com/python/numpy_array_sort.asp</a>  | 3,4 |
| 40. | Numpy  | Exercise on Numpy Array Random technique<br><a href="https://www.w3schools.com/python/numpy_random.asp">https://www.w3schools.com/python/numpy_random.asp</a>   | 3,4 |
| 41. | Pandas | Exercise on Pandas basics:<br><a href="https://www.w3schools.com/python/pandas_tutorial.asp">https://www.w3schools.com/python/pandas_tutorial.asp</a>   | 3,4 |
| 42. | Pandas | Exercise on Pandas installation:<br><a href="https://www.w3schools.com/python/pandas_getting_started.asp">https://www.w3schools.com/python/pandas_getting_started.asp</a>                                       | 3,4 |
| 43. | Pandas | Exercise on Pandas Series data<br><a href="https://www.w3schools.com/python/pandas_series.asp">https://www.w3schools.com/python/pandas_series.asp</a>   | 3,4 |
| 44. | Pandas | Exercise on Pandas Data Frame:<br><a href="https://www.w3schools.com/python/pandas_dataframes.asp">https://www.w3schools.com/python/pandas_dataframes.asp</a>   | 3,4 |
| 45. | Pandas | Exercise on Pandas Open CSV files:<br><a href="https://www.w3schools.com/python/pandas_csv.asp">https://www.w3schools.com/python/pandas_csv.asp</a>   | 3,4 |

|     |                 |  |                |
|-----|-----------------|--|----------------|
| 46. | Pandas          | Exercise on Pandas Data analyzation:<br><a href="https://www.w3schools.com/python/pandas_analyzing.asp">https://www.w3schools.com/python/pandas_analyzing.asp</a>  | 3,4            |
| 47. | Pandas          | Exercise on Pandas Data Cleaning techniques:<br><a href="https://www.w3schools.com/python/pandas_cleaning.asp">https://www.w3schools.com/python/pandas_cleaning.asp</a>  | 3,4            |
| 48. | Pandas          | Exercise on Pandas Data Correlation:<br><a href="https://www.w3schools.com/python/pandas_correlations.asp">https://www.w3schools.com/python/pandas_correlations.asp</a>  | 3,4            |
| 49. | Stats           | Perform Mean, Midian and mode:<br><a href="https://www.w3schools.com/python/python_ml_mean_median_mode.asp">https://www.w3schools.com/python/python_ml_mean_median_mode.asp</a>  | 2              |
| 50. | Stats           | Perform Standard Deviation:<br><a href="https://www.w3schools.com/python/python_ml_standard_deviation.asp">https://www.w3schools.com/python/python_ml_standard_deviation.asp</a>   | 2              |
| 51. | SQL             | Perform all SQL commands from here:<br><a href="https://www.tutorialspoint.com/sql/index.htm">https://www.tutorialspoint.com/sql/index.htm</a>   |                |
| 52. | Plotly          | Perform practical examples from the book:<br>Interactive Dashboards and Data Apps with Plotly and Dash<br>[Elias Dabbas, Pack Publishing Ltd.]<br> |                |
| 53. | Microsoft Azure | Microsoft Azure Video Lectures at Microsoft Learning   | 7,8, 9, 10, 11 |

## Annexure-II

### SUGGESTIVE FORMAT AND SEQUENCE ORDER OF MOTIVATIONAL LECTURE.

#### Mentor

Mentors are provided an observation checklist form to evaluate and share their observational feedback on how students within each team engage and collaborate in a learning environment. The checklist is provided at two different points: Once towards the end of the course. The checklists are an opportunity for mentors to share their unique perspective on group dynamics based on various team activities, gameplay sessions, pitch preparation, and other sessions, giving insights on the nature of communication and teamwork taking place and how both learning outcomes and the student experience can be improved in the future.

#### Session- 1 (Communication):

Please find below an overview of the activities taking place Session plan that will support your delivery and an overview of this session's activity.

| Session- 1 OVERVIEW   |
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| Aims and Objectives:  |
| <ul style="list-style-type: none"><li>To introduce the communication skills and how it will work</li><li>Get to know mentor and team - build rapport and develop a strong sense of a team</li><li>Provide an introduction to communication skills</li><li>Team to collaborate on an activity sheet developing their communication, teamwork, and problem-solving</li><li>Gain an understanding of participants' own communication skills rating at the start of the program</li></ul> |

| Activity:  | Participant Time | Teacher Time | Mentor Time |
|--|------------------|--------------|-------------|
| Intro Attend and contribute to the scheduled.          |                  |              |             |
| Understand good communication skills and how it works. |                  |              |             |
| Understand what good communication skills mean         |                  |              |             |

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| Understand what skills are important for good communication skills  |   |  |
| <b>Key learning outcomes:</b>   | <b>Resources:</b>   | <b>Enterprise skills developed:</b>  |
| <ul style="list-style-type: none"> <li>• Understand the communication skills and how it works.</li> <li>• Understand what communication skills mean</li> <li>• Understand what skills are important for communication skills</li> </ul> | <ul style="list-style-type: none"> <li>• Podium</li> <li>• Projector</li> <li>• Computer</li> <li>• Flip Chart</li> <li>• Marker</li> </ul> | <ul style="list-style-type: none"> <li>• Communication</li> <li>• Self Confidence</li> <li>• Teamwork</li> </ul> |

| Schedule                      | Mentor Should do  |
|-------------------------------|---|
| <b>Welcome:<br/>5 min</b>     | Short welcome and ask the <b>Mentor</b> to introduce him/herself.<br>Provide a brief welcome to the qualification for the class.  |
|                               | Note for Instructor: Throughout this session, please monitor the session to ensure nothing inappropriate is being happened.   |
| <b>Icebreaker:<br/>10 min</b> | Start your session by delivering an icebreaker, this will enable you and your team to start to build rapport and create a team presentation for the tasks ahead.<br>The icebreaker below should work well at introductions and encouraging communication, but feel free to use others if you think they are more appropriate. It is important to encourage young people to get to know each other and build strong team links during the first hour; this will help to increase their motivation and communication throughout the sessions. |

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| <p><b>Introduction &amp; Onboarding:</b><br/><b>20mins</b></p> | <p>Provide a brief introduction of the qualification to the class and play the “Onboarding Video or Presentation”. In your introduction cover the following:</p> <ol style="list-style-type: none"> <li>1. Explanation of the program and structure.</li> <li>2. How you will use your communication skills in your professional life.</li> <li>3. Key contacts and key information – e.g. role of teacher, mentor, and SEED. Policies and procedures (user agreements and “contact us” section). Everyone to go to the Group Rules tab at the top of their screen, read out the rules, and ask everyone to verbally agree. Ensure that the consequences are clear for using the platform outside of hours. (9am-8pm)</li> <li>4. What is up next for the next 2 weeks ahead so young people know what to expect (see pages 5-7 for an overview of the challenge). Allow young people to ask any questions about the session topic.</li> </ol> |
| <p><b>Team Activity Planning:</b><br/><b>30 minutes</b></p>    | <p>MENTOR: Explain to the whole team that you will now be planning how to collaborate for the first and second collaborative Team Activities that will take place outside of the session. There will not be another session until the next session so this step is required because communicating and making decisions outside of a session requires a different strategy that must be agreed upon so that everyone knows what they are doing for this activity and how.</p> <ul style="list-style-type: none"> <li>• “IDENTIFY ENTREPRENEURS” TEAM ACTIVITY</li> <li>• “BRAINSTORMING SOCIAL PROBLEMS” TEAM ACTIVITY”</li> </ul> <p><i>As a team, collaborate on a creative brainstorm on social problems in your community. Vote on the areas</i></p>  |

|   |   |
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|   | <p><i>you feel most passionate about as a team, then write down what change you would like to see happen.</i></p> <p>Make sure the teams have the opportunity to talk about how they want to work as a team through the activities e.g. when they want to complete the activities, how to communicate, the role of the project manager, etc.</p> <p>Make sure you allocate each young person a specific week that they are the project manager for the weekly activities and make a note of this.</p> <p>Type up notes for their strategy if this is helpful - it can be included underneath the Team Contract.</p> |
| <p><b>Session Close:</b><br/><b>5 minutes</b></p> | <p><b>MENTOR:</b> Close the session with the opportunity for anyone to ask any remaining questions.</p> <p><b>Instructor:</b><br/>Facilitate the wrap-up of the session. A quick reminder of what is coming up next and when the next session will be.</p>  |

## Motivational Lectures Link

| Topic                          | Speaker                       | Link  |
|--------------------------------|-------------------------------|---|
| How to face Problems in life   | Qasim Ali Shah<br>Mr. Menk    | <a href="https://www.youtube.com/watch?v=OrQte08MI90">https://www.youtube.com/watch?v=OrQte08MI90</a><br><a href="https://www.youtube.com/watch?v=jL28c7n2Wzo&amp;pp=ygUPbWVuayBtb3RpdmF0aW9u">https://www.youtube.com/watch?v=jL28c7n2Wzo&amp;pp=ygUPbWVuayBtb3RpdmF0aW9u</a>  |
| Just control your Emotions     | Qasim Ali Shah<br>Mr. Menk    | <a href="https://www.youtube.com/watch?v=JzFs_____yJt-w">https://www.youtube.com/watch?v=JzFs_____yJt-w</a><br><a href="https://www.youtube.com/watch?v=UDE52Cr3c3w">https://www.youtube.com/watch?v=UDE52Cr3c3w</a>  |
| How to Communicate effectively | Qasim Ali Shah<br>Mr. Menk    | <a href="https://www.youtube.com/watch?v=PhHAQEGehKc">https://www.youtube.com/watch?v=PhHAQEGehKc</a><br><a href="https://www.youtube.com/watch?v=pK5bDFAjvpc">https://www.youtube.com/watch?v=pK5bDFAjvpc</a>  |
| Your attitude is Everything    | Tony Robbins<br>Mr. Menk      | <a href="https://www.youtube.com/watch?v=5fS3rj6eIFg">https://www.youtube.com/watch?v=5fS3rj6eIFg</a><br><a href="https://www.youtube.com/watch?v=9vxH7iWS100">https://www.youtube.com/watch?v=9vxH7iWS100</a><br><a href="https://www.youtube.com/watch?v=LJbRAK_Sp9E">https://www.youtube.com/watch?v=LJbRAK_Sp9E</a> |
| Defeat fear, build Confidence  | Shaykh Atif Ahmed<br>Mr. Menk | <a href="https://www.youtube.com/watch?v=s10dzfbozd4">https://www.youtube.com/watch?v=s10dzfbozd4</a><br><a href="https://www.youtube.com/watch?v=ifz4ni6Os0E">https://www.youtube.com/watch?v=ifz4ni6Os0E</a><br><a href="https://www.youtube.com/watch?v=3MqN7lptaj4">https://www.youtube.com/watch?v=3MqN7lptaj4</a> |
| Wisdom of The eagle            | Learn Kurooji                 | <a href="https://www.youtube.com/watch?v=bEU7V5rJTtw">https://www.youtube.com/watch?v=bEU7V5rJTtw</a>   |
| The power of attitude          | Titan Man                     | <a href="https://www.youtube.com/watch?v=r8LJ5X2ejqU">https://www.youtube.com/watch?v=r8LJ5X2ejqU</a>   |
| How to ace your exams          | Mr. Zia                       | <a href="https://www.youtube.com/watch?v=F4pP4O-VPn0">https://www.youtube.com/watch?v=F4pP4O-VPn0</a>   |
| Hopelessness                   | Mr. Ali                       | <a href="https://www.youtube.com/watch?v=yaVEqDU8Rkg">https://www.youtube.com/watch?v=yaVEqDU8Rkg</a>   |

## **Annexure-III**

### **Success Story**

Success story is a source of motivation for the trainees and can be presented in several ways/forms in a NAVTTC skill development course as under: -

1. To call a passed out successful trainee of the institute. He will narrate his success story to the trainees in his own words and meet trainees as well.
2. To see and listen to a recorded video/clip (5 to 7 minutes) showing a successful trainee Audio-video recording that has to cover the above-mentioned points.\*
3. The teacher displays the picture of a successful trainee (name, trade, institute, organization, job, earning, etc) and narrates his/her story in the teacher's own motivational words.



### Workplace/Institute Ethics Guide

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Work ethic is a standard of conduct and values for job performance. The modern definition of what constitutes good work ethics often varies. Different businesses have different expectations. Work ethic is a belief that hard work and diligence have a moral benefit and an inherent ability, virtue, or value to strengthen character and individual abilities. It is a set of values-centered on the importance of work and manifested by determination or desire to work hard.

The following ten work ethics are defined as essential for student success:

1. **Attendance:**

Be at work every day possible, plan your absences don't abuse leave time. Be punctual every day.

2. **Character:**

Honesty is the single most important factor having a direct bearing on the final success of an individual, corporation, or product. Complete assigned tasks correctly and promptly. Look to improve your skills.

3. **Team Work:**

The ability to get along with others including those you don't necessarily like. The ability to carry your weight and help others who are struggling. Recognize when to speak up with an idea and when to compromise by blend ideas together.

4. **Appearance:**

Dress for success set your best foot forward, personal hygiene, good manner, remember that the first impression of who you are can last a lifetime

5. **Attitude:**

Listen to suggestions and be positive, accept responsibility. If you make a mistake, admit it. Values workplace safety rules and precautions for personal and co-worker safety. Avoids unnecessary risks. Willing to learn new processes, systems, and procedures in light of changing responsibilities.

6. **Productivity:**

Do the work correctly, quality and timelines are prized. Get along with fellows, cooperation is the key to productivity. Help out whenever asked, do extra without being asked. Take pride in your work, do things the best you know-how. Eagerly focuses energy on accomplishing tasks, also referred to as demonstrating ownership. Takes pride in work.

Big Data Analytics

**7. Organizational Skills:**

Make an effort to improve, learn ways to better yourself. Time management; utilize time and resources to get the most out of both. Take an appropriate approach to social interactions at work. Maintains focus on work responsibilities.

**8. Communication:**

Written communication, being able to correctly write reports and memos. Verbal communications, being able to communicate one on one or to a group.

**9. Cooperation:**

Follow institute rules and regulations, learn and follow expectations. Get along with fellows, cooperation is the key to productivity. Able to welcome and adapt to changing work situations and the application of new or different skills.

**10. Respect:**

Work hard, work to the best of your ability. Carry out orders, do what's asked the first time. Show respect, accept, and acknowledge an individual's talents and knowledge. Respects diversity in the workplace, including showing due respect for different perspectives, opinions, and suggestions.

